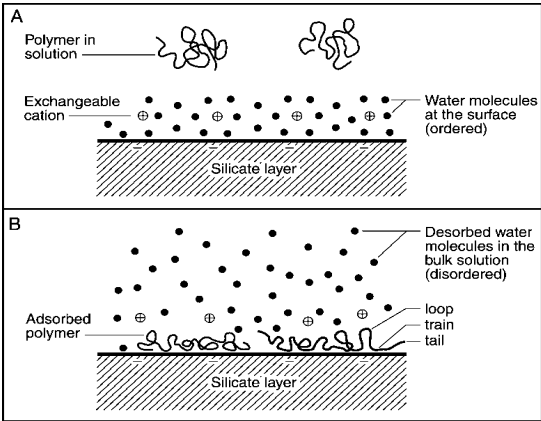
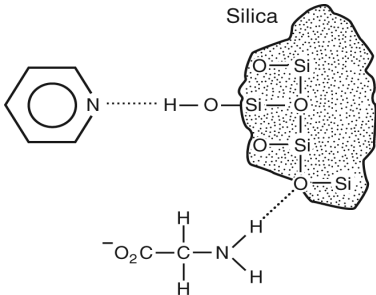


Surface Chemistry of Organic-Mineral Interactions

Adsorption Mechanisms	Illustration	Some Relevant Minerals	Principal Organic Functional Groups Involved	A Few Significant Soil Properties
Hydrophobic Interactions (aka physical bonding, van der Waals interactions)		any minerals with neutral microsites, eg smectite and kaolinite surfaces	uncharged, nonpolar groups eg aromatic, alkyl C	solution ionic strength amount SOM already attached to minerals
Hydrogen Bonding		any minerals with oxygen surfaces, eg kaolinite	amines, carbonyl, carboxyl, phenylhydroxyl, heterocycle N	water content
Protonation	$\text{Clay}]^{-} \cdots \text{H}_3\text{O}^{+} \cdots \begin{Bmatrix} \text{O} \\ \parallel \\ \text{O} \end{Bmatrix} \text{C}-\text{R}$	aluminosilicate edge sites Fe and Al oxides allophane and imogolite	amines, heterocyclic N, carbonyl, carboxylate	pH cations present water content
Ligand Exchange	$\text{Clay}]^{-}\text{OH} + \begin{Bmatrix} \text{O} \\ \parallel \\ \text{HO} \end{Bmatrix} \text{R} \rightarrow \text{Clay}] \begin{Bmatrix} \text{O} \\ \parallel \\ \text{O} \end{Bmatrix} \text{R} + \text{H}_2\text{O}$	aluminosilicate edge sites Fe and Al oxides allophane and imogolite	carboxylate, phenolate	structural metal cation water content

Surface Chemistry of Organic-Mineral Interactions

Adsorption Mechanisms	Illustration	Some Relevant Minerals	Principal Organic Functional Groups Involved	A Few Significant Soil Properties
Ion Exchange <i>permanent charge sites</i> (cation exchange)		smectite, vermiculite, illite	amines, ring NH, heterocyclic N	cations present
<i>pH-dependent charge sites</i> (anion exchange usually, cation exchange rarely)		aluminosilicate edge sites Fe and Al oxides allophane and imogolite	carboxylate for anion exchange, amines, ring NH, heterocyclic N for cation exchange	pH solution ionic strength
Cation Bridging		smectite, vermiculite, illite	carboxylate, amines, carbonyl, alcoholic OH	cations present
Water Bridging		smectite, vermiculite, illite	amines, carboxylate, carbonyl, alcoholic OH	cations present water content

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